Orduiance Survey 1986

ROCC MAPS THE FUTURE AT THE ORDNANCE SURVEY

The Ordnance Survey is like a 'map factory' says Ian Whatmore – branch manager, computer operations and the man in charge of the ROCC 2830 computer at its Southampton headquarters.

"WHAT we have here is fundamentally a 'map factory'," explains Ian Whatmore, branch manager, computer operations at the Ordnance Survey's Southampton head office. "Everything that is needed to produce a map from raw data to a final printed paper sheet is on this site," he continues. "In common with other 'factories', automation and computerisation are playing an ever increasing role in our business. In our case 'business' means being responsible for the official surveying and topographic mapping of Britain down to the low water mark."

The Ordnance Survey (OS) was founded in 1791 to produce maps of the south coast of England for military purposes. With the threat of invasion from France, the British Army required accurate maps of scale one inch to one mile. The survey was carried out by the Board of Ordnance – a Crown organisation that existed at that time. The Board was responsible for artillery, army engineers and armaments, hence the name 'Ordnance' Survey. The first offices of the OS were located in the Tower of London.

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The OS grew over time, reflecting an increasing need for more accurate maps as social reform and the industrial revolution changed the face of Britain. Originally housed in the Tower of London the OS headquarters moved to Southampton in 1841. In 1968 it brought all its central functions together by moving into a new purpose-built office and works complex in Romsey Road, Maybush.

Some 2000 staff are employed at Maybush with a further 1000 surveyors located in 120 local offices around the country. Although the OS is an independent department, its staff are civil servants under the Department of the Environment.

Despite being strictly a civil service department, the OS is required to obtain half its funds from commercial activities, mainly from map sales and professional services. Organisations served include local authorities, public utilities, architects, planners, schools, HM Land Registry and so on.

In 1984 the Directorate of Overseas Surveys merged with Ordnance Survey and OS now conducts a significant amount of work on a contract basis for developing countries overseas. By using the most modern methods, including electronic survey and remote sensing, the OS competes successfully in a very brisk market.

As part of its current programme, the OS has been engaged, since 1972, in digitising the maps of Britain. Put simply, digitising involves representing conventional map detail (line, point and text) in a form suitable for manipulation by computer. Once recorded, the information can be stored and updated at will and quickly re-drawn at an appropriate scale using an automatic plotter.

The vital link in the digitising process, that of putting coded mapping data onto mainframe computer systems, is a ROCC 2830 connected to eight workstations. The scale of the task is enormous, as Whatmore explains. "We are currently digitising some 6000 maps annually at the three basic scales 1:1250, 1:2500 and 1:10000. So far we have completed over 30,000 maps, but with 250,000 maps, in total, to tackle we are projecting to finish in the year 2015. The job will certainly see me out!," he adds.

Digitisation offers a number

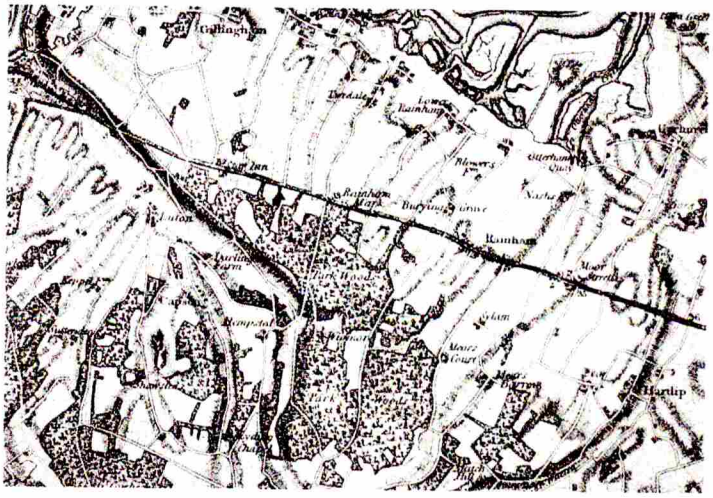
of advantages. Firstly, once captured the data can be updated quickly and maps reduced or enlarged at will. Secondly, digitised information offers an improved service to the end user who can be supplied with data on a more accurate, more selective and more readily updated basis. Thirdly, storage is efficient – over 60 maps may be stored in digital form on a single magnetic tape for a customer. Over time there is no detail degradation because the map is always plotted from the original digitised coordinates.

the 2830 and, eventually, to tape storage.

Each group of sheets is preceded by a 'header' giving the map scale, the date of the survey, boundary information, date, and so on. The software run on the system, which was written by the OS, enables the input information to be validated.

Once the information has been loaded to tape, it is computer matched on a dual ICL 2966 against information directly input by draughtsmen. This information is loaded every evening by way of a communications line and magnetic tape. The mainframe computer processes the digitised map data to eliminate distortion from the source document, transforms all the 'table' coordinates to National Grid coordinates, links feature coordinates to feature codes and gives each sector a serial number.

Given correct coordinates each map will be located in an appropriate and consistent position. Once the match has been made, a 'raw' map is produced from one of five fast four-colour plotters. This 'edit



Extract from the map: "County of Kent with part of the County of Essex. Done by the surveying draftsmen of his Majesty's Honourable Board of Ordnance under the direction of Capt. W. Mudge of the Royal Artillery FRS".

Scale 1 inch to 1 mile

Date 1801 – started 1791

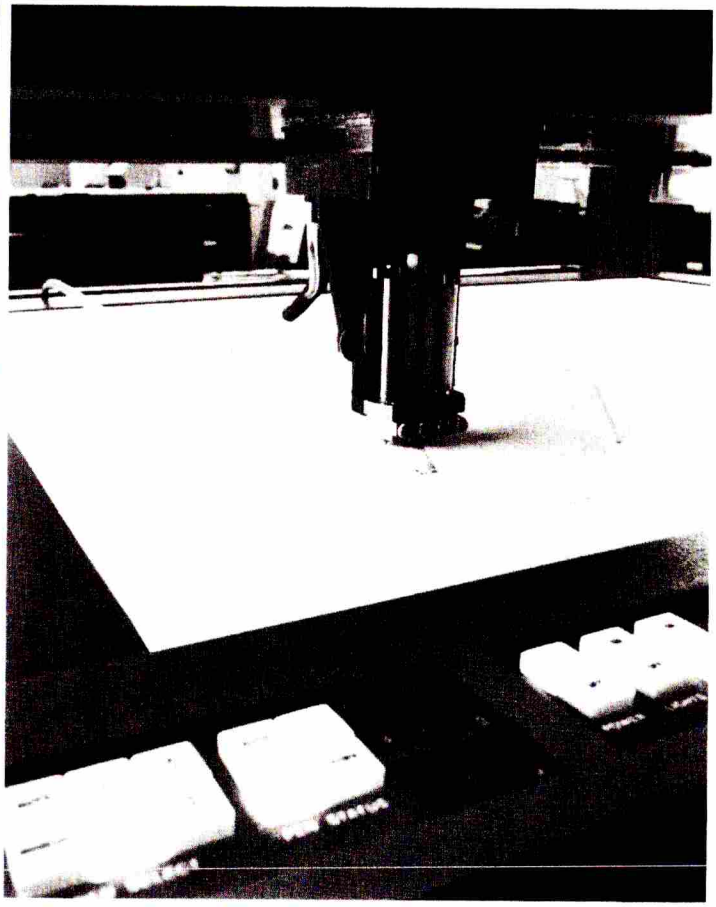
Engraved by Thomas Foot.

The map is a compilation of separate 1" to 1 mile maps. Produced in the Tower of London.

Measuring the length of the Lossiemouth Base, carried out between 1909-1911 by Ordnance Survey surveyors. This base line covering many kilometers was used to test the completion of the triangulation of Britain.

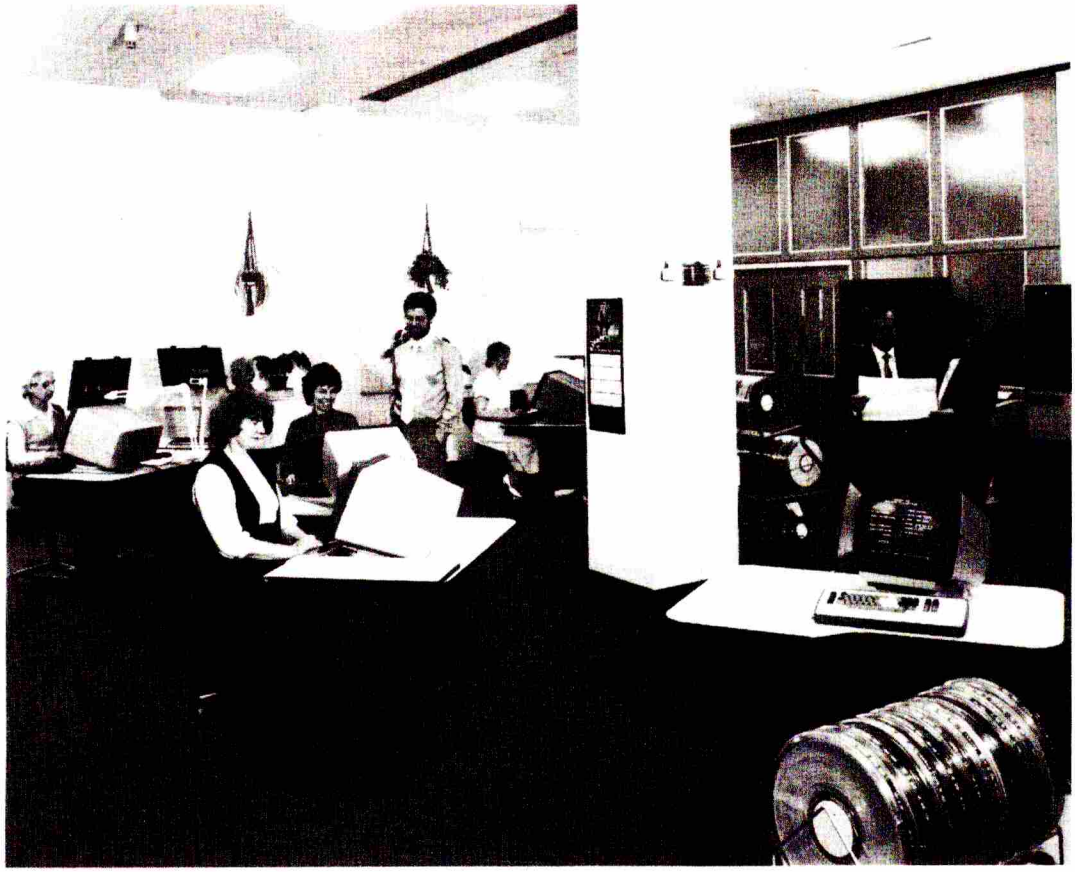
The map data is recorded from enlarged film negatives of the Ordnance Survey surveyor's working drawing. This document (the Master Survey Drawing) is kept up-to-date by field surveyors located throughout England, Scotland and Wales. The digitising process begins as the enlarged negative is placed on a digitising table and the map information is digitised manually using a cursor. The intersection of the cross-hairs on the cursor is placed over a part of the map detail and, as one of the cursor's buttons is pressed, the coordinates of that point are automatically processed and transferred onto magnetic tape.

At this point, however, the map is only half finished. There are many names and descriptions, including houses, streets, and spot heights, that need to be added to the map in order to make it complete. This is achieved using the ROCC system. 'Digital text input' requires the data entry operator to transfer sheets of coded information relevant to maps from data sheets supplied by draughtsmen into



An automatic plotter in action in the computer room at the Ordnance Survey, Southampton.

Given correct coordinates, the detail on each map will be defined in its appropriate position in relation to the National Grid. Once this conversion has been made, a 'raw' map is produced from one of five fast four-colour plotters.



Although data entry for digital mapping forms the bulk of the day's work for the ROCC 2830 installation at the Southampton headquarters of the Ordnance Survey, it also processes information on map sales, new customer details, accounting applications and so on.

Pictured checking a printout are l to r: Ian Whatmore – branch manager, computer operations and Lynn MacLean – dp supervisor.

Below: Gordon Kelly – shift leader, lovingly looks after the three Xynetics automatic plotters which are installed in the computer room at the Ordnance Survey, Southampton.

plot' is then given back to a draughtsman for overlay of the original surveyor's Master Survey Drawing to check for accuracy and correct feature coding.

Any mistakes are rectified using interactive editing stations connected to DEC VAX machines. When the draughtsman is satisfied with the map, the digitised data is transferred back to the ICL equipment and held in a databank.

It is hoped that OS surveyors will eventually be equipped with computer terminals in the local offices so that map information can be immediately updated as the surveyor returns from the field. Similarly, if local authorities or other large users have the appropriate equipment, the most up-to-date maps will be drawn on the user's premises, by using computer tapes supplied by the OS.

Although data entry for digital mapping forms the bulk of the day's work for the ROCC system, between 11.30 and 2.00 every day the system is turned over to other functions. Its task is to process information, including map sales, new customer details, accounting applications, production details and so on. It is also used to provide data for managerial information systems and is involved in data entry to enable the OS to compile and maintain a gazetteer of the name of every town and village on the 1:50000 map of Britain.

Of the eight workstations currently operated by the OS only seven are actually located in the OS building itself. The eighth can be found in a suburban house not far from Romsey Road. The house belongs to Mrs Jackie Craig who, after a short absence, has returned to work for the OS. Mrs Craig works at home, coming to the OS in the morning to collect the day's data entry and returning home to key in the work on the remote workstation.

"It really is a fine example of technology helping people in difficulty."

The workstation was installed by ROCC so that Mrs Craig can both operate a workstation and look after her daughter who is severely disabled by arthritis. "It really is a fine example of technology helping people in difficulty," says Whatmore. "Mrs Craig is a very experienced and valued member of staff and I am delighted that we can continue to employ her on a basis that suits both of us. Thanks to ROCC, the OS has shown that even in the most competitive environment it is possible to combine compassion with good business sense."